ShriVaishnavVidyapeethVishwavidyalaya, Indore
ShriVaishnav Institute of Information Technology
B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)
Choice Based Credit System (CBCS)-2025-29
SEMESTER-II

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTMACS201	BS	Linear Algebra	60	20	20	0	0	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:
The student will have ability to:
1. Know the fundamental principles of the Linear algebra.
2. Understand and apply the basics of the Matrices and Vector Space.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Apply the techniques to find the Solution of Linear equations.
2. Apply the basics of the calculus of the Determinants.
3. Apply the basics of the calculus of the Matrices.
4. Apply the concept of Singular value decomposition and Principal component analysis in Image Processing and Machine Learning.

SYLLABUS
UNIT I **10 HOURS**

Introduction to Matrices and Determinants: Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.

UNIT II **9 HOURS**

Vectors and linear combinations: Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.

UNIT III **8 HOURS**

Vector space: Dimension; Basis; Orthogonally; Projections; Gram-Schmidt or thogonalization and QR decomposition

UNIT IV **7 HOURS**

Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations; Hermit Ian and unitary matrices;

UNIT V **8 HOURS**

Singular value decomposition and Principal component analysis; Introduction to their applications in Image Processing and Machine Learning.

TEXTBOOKS:
1. Higher Engineering Mathematics, B. S. Grewal.

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REFERENCE:

1. Advanced Engineering Mathematics, 7th Edition, Peter V. O'Neil.
2. Advanced Engineering Mathematics, 2nd Edition, Michael. D. Greenberg.
3. Introduction to linear algebra, 5th Edition, Gilbert Strang.
4. Applied Mathematics (Vol. I & II) , by P. N. Wartikar& J. N. Wartikar.
5. Digital Image Processing, R C Gonzalez and R E Woods
6. https://machinelearningmastery.com/introduction-matrices-machine-learning

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BTEC 104	BEC	Digital Logic & Circuit Design	60	20	20	30	20	3	1	2	5

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COURSE OBJECTIVES:
The student will have ability to:
1. Use of Boolean algebra and Karnaugh Map to simplify logic function.
2. Describe the operation of different Combinational and Sequential Logic Circuits.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Design an optimal digital logic circuit to meet the given specifications.
2. Evaluate the performance of the given digital logic circuit based on specific criteria for reliable system implementation.

SYLLABUS
UNIT I — 10 HOURS
Number System: Introduction to number systems: Decimal, Binary, Octal and Hexadecimal, Base Conversion. Signed Binary Numbers: Signed magnitude, 1's Complement and 2's Complement representation and their arithmetic operations, 32-bit Floating point representation, Codes: Types of code, Binary code, BCD, Gray code, Excess-3. BCD Addition, Code Conversion, Error Detecting and Correcting code: Even and Odd Parity, Hamming code.

UNIT II — 9 HOURS
Boolean algebra and Logic gates: Introduction to logic gates, Boolean Laws, De-morgan's theorem, Consensus theorem, Implementation using logic gates, Simplification of Boolean Expression using Boolean Laws, Canonical and Standard (SOP and POS) forms. Universal gates, NAND-NOR implementation of logic functions. Karnaugh Maps (K-maps), Minimization of logic functions using K-map. Don't Care Conditions.

UNIT III — 8 HOURS
Combinational circuits: Arithmetic circuits- Half adder, Full adder, Half sub tractor, Full sub tractor, Parallel Adder, BCD adder, Multiplexer, De-multiplexer, Encoder and Decoder. Design of Combinational circuits using Multiplexer and Decoder.

UNIT IV — 7 HOURS
Sequential Circuits: Introduction, Asynchronous and Synchronous Sequential circuits, Latches and Flip Flops: SR, D, JK and T. Characteristic equation, Characteristic and Excitation table. Master-Slave Flip-flop, Race around conditions, Flip flop conversion.

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UNIT V — 8 HOURS

Applications of Flip-flop: Shift Register: SISO, SIPO, PISO, PIPO, Left and Right Shift Register, Bidirectional Shift Register. Counter: Ring counter, Johnson Counter, Asynchronous Up/down counter, Synchronous Up/down counters: State diagram, state table and realization, Mod-N Counter.

TEXTBOOKS:

1. M. Morris Mano "Digital Logic and Computer Design", Pearson Education, 2016.
2. S Salivahanan and S Arivazhagan: Digital Circuits and Design, 4th Edition, Vikas Publishing House, 2012.

REFERENCE:

1. A. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, PHI, 2016.
2. Floyd and Jain, "Digital Fundamentals", 10th Edition, Pearson Education India 2011.
3. Roland J. Tocci, Widmer, Moss, "Digital Systems Principles and Applications", 10th Edition, Pearson 2009.
4. Stephen Brown, Zvanko Vranesic, "Fundamentals of Digital Logic Design", 3rd Edition, McGraw Hill, 2017.

LIST OF PRACTICALS

1. To study the operation of various logic gates and verify their truth tables.
2. To verify De morgans theorem
3. To verify the versatility of NAND and NOR gates
4. To compare and verify standard SOP/POS expression with minimized Boolean form using K- map.
5. To design and verify Adder and sub tractor circuits.
6. To design and verify multiplexer and DE multiplexer using basic logic gates.
7. To realize 4-bit parallel adder circuit.
8. To design and verify encoder and decoder circuits using ICs.
9. To verify the truth table of different flip flops.
10. To verify the functionality of shift register.
11. To verify the functionality of counter circuit.

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BTCS202M	DCC	Object Oriented Programming with C++	60	20	20	30	20	3	0	2	4

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COURSE OBJECTIVES:

The student will have ability to:

1. To explain abstract data types, classes and different types of objects.
2. To analyze the public, protected and private modes of inheriting the classes.
3. To demonstrate the overloading of functions and operators to grant them a different meaning.
4. To provide complete knowledge of Object Oriented Programming through C++ and to enhance the programming skills of the students by giving practical assignments to be done in labs.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Identify and describe the components of object-oriented technology and justify their relevance.
2. Implement inheritance for code reusability and polymorphism.
3. Implement object-oriented approach for real world scenarios.
4. Use advance features like temples and exception to make programs supporting reusability and sophistication
5. Develop the applications using object oriented programming with C++.

SYLLABUS

UNIT I — 10 HOURS

Concepts of OOP: Introduction OOP, Procedural vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP. C++ Basic Overview, Program structure, namespace, identifiers, variables, constants, enema, operators, typecasting, control structures.

UNIT II — 9 HOURS

C++ Functions: The Main Function, Function prototyping, Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments.

UNIT III — 8 HOURS

Objects and Classes: Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, friend function.

Inheritance: Concept of Inheritance, types of inheritance, access modifiers, overriding, virtual base class

UNIT IV — 7 HOURS

Polymorphism: Polymorphism and its types, Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism, Abstract Methods and Classes.

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Exception Handling, Templates function and class in C++

UNIT V 8 HOURS

I/O and File management: Concept of Streams, Cen and Court Objects, C++ Stream Classes, Unformatted and Formatted I/O, Manipulators, File Stream, C++ File Stream Classes, File Management Functions, File Modes, Binary and Random Files.

TEXTBOOKS:

1. David Parsons; Object oriented programming with C++; Second edition; BPB publication; 1997.
2. Robert Lafore; Object oriented programming in C++ ; Fourth edition ; Pearson publication;2002 .
3. E Balagurusamy; Object oriented programming with C++; Seven edition; TMH; 2017.
4. Herbert Scheldt Java Complete Reference Seven edition; McGraw-Hill; 2006 .

REFERENCE:

1. John R Hubbard; Programming in C++ (Schaum); Third edition; TMH; 2000
2. Venugopal; Mastering C++ ; second edition ;TMH; 2006.
3. Steven Holzner; C++ Programming Black Book; First Edition; Cariole's Group, U.S; 2001.
4. E Balagurusamy; Programming with java a primer; Fourth edition; TMH; 2011.

LIST OF PRACTICALS

1. Write a program to display the following output using a single cout statement. Maths=90, Physics=74, Chemistry=76
2. Write a program to read 2 numbers from the keyboard and display the larger value on the screen.
3. Write a function using reference variables as arguments to swap the values of a pair of integers.
4. Write a macro that obtains the largest of 3 numbers.
5. Create two classes DM and DB which store the value of distances. DM stores distances in meters and centimeters and DB in feet and inches. Write a program that can read values for the class objects and odd one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results may be a DM object or DB object, depending on the units in which the result are required. The display should be in the format of feet and inches or meters and centimetre's depending on the object on display.
6. Define a class to represent a bank account. Include the following members:

   Data members

   1. Name of the depositor
   2. Account number
   3. Type of account

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4. Balance amount in the account

Member functions

1. To assign initial values
2. To deposit an amount
3. To withdraw an amount after checking the balance
4. To display name and balance

Write a main program to test the program.

7. Design a constructor for bank account class.
8. A book shop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is, then the system displays the book details and requests for the number of copies required. If the requested copies book details and requests for the number of copies required. If the requested copies are available, the total cost of the requested copies is displayed; otherwise the message "Required copies not in stock" is displayed.

   Design a system using a class called books with suitable member functions and Constructors. Use new operator in constructors to allocate memory space required.
9. Improve the system design in exercise 8 to incorporate the following features:

   (a) The price of the books should be updated as and when required. Use a private meneber function to implement this.

   (b) The stock value of each book should be automatically updated as soon as a transaction is completed.

   (c) The number of successful transactions should be recorded for the purpose of statistical analysis. Use static data members to keep count of transaction.
10. Design a C++ Class 'Complex' with data members for real and imaginary part. Provide default and parameterized constructors. Write a program to perform arithmetic operations of two complex numbers using operator overloading (using either member functions or friend functions).
11. Create a base class shape. Use this class to store two double type values that could be used to compute area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base a member function get data to initialize base class data member and another member function display area to compute and display the area of figures. Make display area as a virtual function and redefine it the derived class to suit their requirements.
12. Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class account that stores customer name, account number and type of account. From this derive the classes cor*rect and sav*acct to make them more specific to their requirements. Include necessary

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BTCS202M	**DCC**	**Object Oriented Programming with C++**	**60**	**20**	**20**	**30**	**20**	**3**	0	**2**	4

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member functions in order to achieve the following tasks:

a. Accept deposit from a costumer and update the balance.
b. Display the balance
c. Compute and deposit interest.
d. Permit withdrawal and update the balance.

Check for the minimum balance, impose penalty, necessary and update balance.

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BTCS102M	DCC	Introduction to Design Thinking	60	20	20	30	20	2	0	2	3

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COURSE OBJECTIVES:
The student will have ability to:
1. To learn the concepts of Business Process Manager.
2. To emphasizing the concepts of reuse, ease of maintenance, and high-quality development strategies.
3. To create a simple case and a business process definition (BPD) from business requirements.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Define business process management (BPM)
2. List and describe the phases in the BPM lifecycle Procedure
3. Define process modelling
4. Create a process application.
5. Describe IBM Business Process Manager product components.
6. Understand what came before Design Thinking.
7. See how design thinking is introduced in an organization
8. Learn how it built upon previous approaches.
9. Get an overview of the whole approach to design thinking.
10. Understand the principles, loop, and keys.

SYLLABUS
UNIT I — 10 HOURS

INTRODUCTION TO BUSINESS PROCESS MANAGEMENT &AS-IS BUSINESS: PROCESS Define business process management (BPM), List and describe the phases in the BPM lifecycle procedure, Define process modeling., Describe how to use IBM Business Process Manager to accomplish process modeling goals, Explain how to create and modify process applications in the Process Center, Create a process application, Explain case management, Describe the purpose and function of Blue works Live, List and describe the core notation elements that are used in IBM Process Designer, Create a business process definition (BPD) from the process and nested process tasks and responsible, Explain how to create and modify process models with the Designer view of the IBM Process Designer..

UNIT II — 9 HOURS

PLAYBACK 0: MODELING PROCESS: List and describe gateways as they are used in IBM Process Designer, List and describe intermediate event types that are used in IBM Process Designer, Model a business process escalation path with an attached timer intermediate event, Describe the Playback 0 validation goals and

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requirements, Validate that a process model meets Playback 0 goals and Requirements, Describe IBM Business Process Manager product components, Identify the integrations with other IBM products.

UNIT III **8 HOURS**

ENTERPRISE DESIGN THINKING – HISTORY, OVERVIEW: Understand what came before Design Thinking, Identify who did what to bring it about, Learn how it built upon previous approaches, Get an overview of the whole approach to design thinking, Understand the principles, loop, and keys, Determine what is most important.

UNIT IV **7 HOURS**

ENTERPRISE DESIGN THINKING –7 KEY HABITS, THE LOOP, USER RESEARCH: Learn 7 key habits of effective thinkers design, Avoid common anti-patterns, Optimize for success with these habits, Understand the importance of iteration, Learn how to observe, reflect, & make, Get ready to drill down & do tomorrow, Understand the importance of user research, Appreciate empathy through listening, Learn key methods of user research.

UNIT V **8 HOURS**

ENTERPRISE DESIGN THINKING – MAKE, USER FEEDBACK: Understand how Make fits into the Loop, Learn how to leverage Observe information, Learn Ideation, Storyboarding, & Prototyping, Understand user feedback and the Loop, Learn the different types of user feedback, Learn how to carry out getting feedback.

TEXTBOOKS:

1. IBM COURSEWARE – SKILLS ACADEMY

REFERENCE:

1. IBM COURSEWARE – SKILLS ACADEMY

LIST OF PRACTICALS

1. CREATING YOUR FIRST DISCOVERY MAP IN BLUEWORKS LIVE Study of Process Life Cycle.
2. CREATING PROCESS MODEL IN BLUEWORKS LIVE.
3. ADDING AND VIEWING PROCESS DETAILS IN BLUEWORKS LIVE
4. ENTERPRISE DESIGN THINKING - LISTENING
5. ENTERPRISE DESIGN THINKING - HMW
6. ENTERPRISE DESIGN THINKING - USER RESEARCH
7. ENTERPRISE DESIGN THINKING – REFLECT
8. ENTERPRISE DESIGN THINKING – IDEATION
9. ENTERPRISE DESIGN THINKING – STORYBOARDING

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10. ENTERPRISE DESIGN THINKING - CRAFTING HILLS
11. ENTERPRISE DESIGN THINKING – PROTOTYPING

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BTIT208M	SEC	Unix Programming	0	0	0	30	20	0	0	2	1

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COURSE OBJECTIVES:
The student will have ability to:
1. Provide introduction to UNIX Operating System and its File System.
2. Gain an understanding of important aspects related to the SHELL and the process
3. Develop the ability to formulate regular expressions and use them for pattern matching.
4. Provide a comprehensive introduction to SHELL programming, services and utilities
5. Develop the ability to perform different networking tasks

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Describe the architecture and features of UNIX Operating System .
2. Distinguish UNIX Operating System from other Operating Systems
3. Demonstrate UNIX commands for file handling and process control.
4. Show the working of vi editor in all its modes using various commands
5. Write Regular expressions for pattern matching and apply them to various filters for a specific task
6. Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem.
7. Diagnose network using different networking utilities of UNIX

SYLLABUS
UNIT I — 10 HOURS
Introduction to UNIX : The UNIX Operating System, The UNIX Architecture, Features of UNIX, Internal and External Commands, Command Structure.General purpose utilities: cal, date, echo, print, bc, script, passed, path, who, uname, tty, pwd, cd, mkdir, rmdir

UNIT II — 9 HOURS
Handling Files : The File System, touch, cat, cp, rm, mv, more, file, ls, wc, pg, comm, gzip, tar, zip, df, du, The vi editor. Security by file Permissions: chmod umask . Networking commands: ping, telnet, ftp, finger, arp, rlogin.

UNIT III — 8 HOURS
Shell Basics : Types of shells, Shell Functionality, Work Environment, Writing script & executing basic script, Debugging script, Making interactive scripts, Variables (default variables), Mathematical expressions. Conditional statements: If-else-elif, Test command, Logical operators - AND, OR, NOT, Case –esac. Loops: While, For, Until, Break & continue.

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BTIT208M	SEC	Unix Programming	0	0	0	30	20	0	0	2	1

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UNIT IV — 7 HOURS

Command Line Arguments & Regular Expression: Command line arguments: Positional parameters, Set & shift, IFS. Functions & file manipulations: Processing file line by line, Functions. Regular Expression & Filters: Regular expression, grep, cut , paste, sort , head , tail , nl , pipe ,tr, tree , meta characters.

UNIT V — 8 HOURS

SED and AWK - SED: Scripts, Operation, Addresses, commands, Applications.

AWK: Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications awk .

TEXTBOOKS:

1. Sumitabha Das: “YOUR UNIX – The Ultimate Guide”, Tata McGraw Hill.

REFERENCE:

1. Behrouz A. Forouzan, Richard F. Gilbery, “Unix and Shell Programming”,Cengage Learning India.
2. Graham Glass, King Ables, “Unix for programmers and users”, Pearson Education.
3. N.B. Venkateswarlu, “Advanced Unix programming”, B S Publications.
4. Yashavant Kanetkar, “Unix Shell programming”, 1st Edition, BPB Publisher.
5. Stephen Prata “Advanced UNIX: A Programming's Guide”, BPB Publications
6. Maurice J. Bach “Design of UNIX O.S. “, PHI Learning.
7. Brian W. Kernighan & Robe Pike, “The UNIX Programming Environment”, PHI Learning.

LIST OF PRACTICALS

1. Perform installation of UNIX/LINUX operating system.
2. Study of UNIX general purpose utility commands
3. Execution of various file/directory handling commands.
4. Working with the vi editor: Creating and editing a text file with the vi text editor using the standard vi editor commands.
5. Write a shell script for calculator (to perform basic arithmetic and logical calculations).
6. Write a shell script that will take an input file and remove identical lines (or duplicate lines from the file).
7. Shell scripts to explore system variables such as PATH, HOME etc
8. Execution of various system administrative commands.
9. Write awk script that uses all its features
10. Write a shell script to display list of users currently logged in
11. Write a shell script to delete all the temporary files.

ShriVaishnavVidyapeethVishwavidyalaya, Indore

ShriVaishnav Institute of Information Technology

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)
Choice Based Credit System (CBCS)-2025-29
SEMESTER-II

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT208M	**SEC**	**Unix Programming**	**0**	**0**	**0**	**30**	**20**	**0**	0	**2**	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

12. Write shell script to perform different string operations of arrays.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
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BTAIML201M	DCC	Data Fundamentals	60	20	20	30	20	2	0	2	3

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COURSE OBJECTIVES:
The student will have ability to:
1. To introduce the concepts of Cloud Computing.
2. To understand the concepts Data Behaviour on Cloud.
3. To familiar various tool to Handling Data on Azure

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Understand Core data concepts on Azure.
2. Familiar with the use of relational data in Azure.
3. Understand the use of non-relational data in Azure.

SYLLABUS
UNIT I — 10 HOURS
Explore core data concepts: Describe features of structured data, Describe features of semi-structured, Describe features of unstructured data, Describe common formats for data files, Describe types of databases, Describe features of transactional workloads, Describe features of analytical workloads, Identify roles and responsibilities for data workloads, Describe responsibilities for database administrators, Describe responsibilities for data engineers, Describe responsibilities for data analysts.

UNIT II — 9 HOURS
Identify considerations for relational data on Azure: Identify features of relational data, Describe normalization and why it is used, Identify common structured query language (SQL) statements, Identify common database objects, Describe the Azure SQL family of products including Azure SQL Database, Azure SQL Managed Instance, and SQL Server on Azure Virtual Machines, Identify Azure database services for open-source database systems.

UNIT III — 9 HOURS
Describe considerations for working with non-relational data on Azure: Describe capabilities of Azure storage, Describe Azure Blob storage, Describe Azure File storage, Describe Azure Table storage, and Identify use cases for Azure Cosmos DB, Describe Azure Cosmos DB APIs.

UNIT IV — 8 HOURS
Describe an analytics workload on Azur workload on Azure: Describe common elements of large-scale analytics, Describe considerations for data ingestion and processing, Describe options for analytical data stores,

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			THEORY			PRACTICAL					
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BTAIML201M	DCC	Data Fundamentals	60	20	20	30	20	2	0	2	3

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Describe Azure services for data warehousing, including Azure Synapse Analytics, Azure Data bricks, Azure HD Insight, and Azure Data Factory, Describe consideration for real-time data analytics, Describe the difference between batch and streaming data, Describe technologies for real-time analytics including Azure Stream Analytics, Azure Synapse Data Explorer, and Spark structured streaming.

UNIT V **9 HOURS**

Microsoft Power BI: Describe data visualization in Microsoft Power BI, Identify capabilities of Power BI, Describe features of data models in Power BI, Identify appropriate visualizations for data.

REFERENCE:

1. https://docs.microsoft.com/en-us/learn/modules/explore-core-data-concepts/
2. https://docs.microsoft.com/en-us/learn/modules/explore-roles-responsibilities-world-of-data/
3. https://docs.microsoft.com/en-us/learn/modules/explore-relational-data-offerings/
4. https://docs.microsoft.com/en-us/learn/modules/explore-provision-deploy-relational-database- offerings-azure/
5. https://docs.microsoft.com/en-us/learn/modules/explore-provision-deploy-non-relational-data- services-azure/
6. https://docs.microsoft.com/en-us/learn/modules/explore-non-relational-data-stores-azure/
7. https://docs.microsoft.com/en-us/learn/modules/examine-components-of-modern-data-warehouse/
8. https://docs.microsoft.com/en-us/learn/modules/explore-fundamentals-stream-processing/
9. https://docs.microsoft.com/en-us/learn/modules/explore-fundamentals-data-visualization/

LIST OF PRACTICALS

1. Provision Azure relational database services.
2. Explore Azure Storage.
3. Explore Azure Cosmos DB.
4. Explore Azure Synapse Analytics.
5. Analyze streaming data.
6. Process streaming data using Spark.
7. Explore Azure Synapse Data Explorer
8. Visualize data with Power BI
9. Basic SQL command on SQL Server 18